# Dengue

**(Also known as Dengue Fever,
Dengue Hemorrhagic Fever and Breakbone Fever)**

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## 1) THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

Dengue fever (DF) and dengue hemorrhagic fever (DHF) are caused by the same four serotypes of dengue flaviviruses (serotypes 1, 2, 3 and 4).

### B. Clinical Description

DF is an acute, viral illness characterized by sudden onset of fever, severe headache, eye pain, muscle and joint pain, and rash. GI upset and loss of appetite often occur. Swollen lymph nodes, petechiae, nosebleeds and bleeding gums also occur frequently. Recovery is often associated with prolonged fatigue and depression. DHF is a severe viral illness also characterized by sudden onset of fever as well as hemorrhaging. DHF is associated with abnormal blood clotting, low platelet count (thrombocytopenia), and evidence of plasma leaking through capillaries. Patients with GI bleeding have a greater likelihood of dying. Dengue shock syndrome includes all of the criteria for DHF described above, as well as life-threatening, severely reduced blood pressure (hypotension). Fatalities associated with DF are rare. With DHF, case fatality rates without treatment have reached 50%, although with intensive treatment, rates are much lower (1–2%).

### C. Reservoirs

In tropical urban centers, the viruses that cause DF and DHF are maintained in humans and mosquitoes. In parts of Southeast Asia and West Africa, the viruses are maintained in monkeys and mosquitoes.

### D. Mode of Transmission

DF and DHF viruses are transmitted to humans by infected mosquitoes, principally *Aedes aegypti*. Other *Aedes* species also play a role in transmission. These viruses are not transmitted directly from person-to-person.

### E. Incubation Period

The incubation period is usually 4 to 7 days, although it may range from 3 to 14 days.

### F. Period of Communicability or Infectious Period

The diseases DF and DHF are not communicable from person-to-person. People are considered infectious to mosquitoes from a few days before onset to the end of the febrile period, usually about 3–5 days. The mosquito becomes infective 8–12 days after a blood meal from an infectious person or monkey, and it remains infective for its lifetime.

### G. Epidemiology

DF and DHF are endemic in most tropical countries, including those in Asia, Australia, Africa, the Caribbean, Central America and South America. Epidemics occur wherever the vectors are present and virus is introduced. Mosquito vectors are present in the US. Cases were reported in Texas in 1980, 1986, 1995 and 1997. In 1997, 56 imported laboratory-positive cases of DF or DHF were diagnosed at the Centers for Disease Control and Prevention (CDC) Dengue Branch. In addition, 3 locally acquired cases were diagnosed in residents of Texas. DHF occurs more frequently in children. In Massachusetts, DF and DHF are imported diseases.

## 2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

### A. What to Report to the Massachusetts Department of Public Health

- Report any suspicion of dengue called to your attention by a healthcare provider or any positive laboratory result pertaining to dengue. *Note:* See Section 3) C below for information on how to report a case.

### B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI) does not provide testing of clinical specimens for dengue virus. Healthcare providers or laboratories should send specimens to the Viral Serology Laboratory at SLI, which will forward specimens to the appropriate laboratory at the CDC. Call the Viral Serology Laboratory at (617) 983-6396 before samples are submitted. The laboratory can guide you on what specimens to send and how to send them.

## 3) DISEASE REPORTING AND CASE INVESTIGATION

### A. Purpose of Surveillance and Reporting

- To identify imported cases to better understand the epidemiology of endemic and epidemic DF and DHF.
- To ensure that cases are appropriately contained to prevent the introduction of virus into native mosquito populations.
- To identify locally acquired cases, if they occur, so that appropriate active surveillance and mosquito control interventions can be taken.
- To provide travelers with appropriate preventive health information.

### B. Laboratory and Healthcare Provider Reporting Requirements

The Massachusetts Department of Public Health (MDPH) requests that laboratories report to the local board of health in the community where diagnosed all cases of dengue (by telephone, confidential fax or in writing) Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for specific information.

*Note:* Since the CDC is the principal testing laboratory for DF and DHF in the United States, any confirmed cases in Massachusetts residents would be reported to MDPH by CDC, and MDPH would, in turn, notify the local board of health in the community where the case resides.

### C. Local Board of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

The MDPH requests that each local board of health (LBOH) report any case of dengue, as defined by the reporting criteria in Section 2) A, to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official MDPH *Generic Disease Reporting Form* (copy in Appendix A). Please refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**

   a. Case investigation of dengue in Massachusetts residents will be directed by the MDPH Division of Epidemiology and Immunization.

   b. Following notification of the MDPH, the LBOH may be asked to assist in completing an official MDPH *Generic Disease Reporting Form*. Most of the information required on the form can be obtained from the medical provider or the medical record. Use the following guidelines to assist you in completing the form:
      1) Record "Dengue" as the disease being reported.
      2) Record the case's demographic information.
      3) Record the date of symptom onset, symptoms, date of diagnosis, hospitalization information (if applicable), and outcome of disease (*e.g.*, recovered, died).
      4) Exposure history: use the incubation period range for DF, DHF, and dengue shock syndrome (3–14 days). Specifically, focus on the period beginning a minimum of 3 days prior to the case's onset date back to no more than 14 days before onset for the following exposure:
         a. Travel history. Determine the specific date(s) and geographic area(s) visited by the case to identify where the patient may have become infected. This information can be recorded in the "Comments" section at the bottom of the form.

5) Complete the "Import Status" section to indicate where dengue was acquired. If unsure, check "Unknown."
6) Include any additional comments regarding the case in the Comments section.
7) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

c. After completing the form, mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:
MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

# 4) CONTROLLING FURTHER SPREAD

## A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

Dengue is not yet reportable by regulation in Massachusetts; therefore no isolation and quarantine requirements currently exist under *105 CMR 300.200*. However, the following guidelines are recommended. Since DF and DHF are not transmitted person-to-person, there are no restrictions for cases or contacts of cases. Blood precautions are advised. To prevent local spread, cases should avoid exposure to mosquitoes until fever subsides. See 4) B below.

## B. Protection of Contacts of a Case

It is important to prevent mosquitoes from biting a case until their fever subsides. Mosquitoes can be controlled by screening sickrooms, spraying with insecticides and using bed nets. These measures can prevent transmission of dengue fever from patient to mosquitoes. *Note:* The *Aedes aegypti* mosquito has not been found in Massachusetts, although it and other vectors are suspected of expanding their range. Concerns over local transmission should be small.

## C. Managing Special Situations

**Locally Acquired Case**

As noted above in Section 4) B, a locally acquired case of dengue would be an unusual occurrence as the *A. aegypti* mosquito has not been found in Massachusetts. But if you determine during the course of an investigation that a case does not have a recent travel history to an endemic country, environmental measures such as investigating local areas visited by the case to locate the focus of infection and surveillance of other people for illness may be necessary.

**Reported Incidence Is Higher Than Usual/Outbreak Suspected**

Outbreaks can occur wherever vectors are present and virus is introduced. These outbreaks can be extensive and affect a large number of people. If you suspect an outbreak, investigate to determine source of infection and mode of transmission. A common exposure to or an association with *A. aegypti* mosquitoes (*e.g.*, travelers returning from endemic countries) should be sought and applicable preventive or control measures should be instituted.

For either situation, contact the on-call epidemiologist at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. The Division can help determine a course of action to

prevent further cases and can perform surveillance for cases across town lines and therefore be difficult to identify at a local level.

### D. Preventive Measures

**International Travel**

Since epidemics of dengue can be extensive and may affect a high percentage of the population, travelers should avoid areas with ongoing epidemics. However for those who do travel to endemic areas, it is recommended that:

- Travelers protect themselves from mosquitoes by using repellents, wearing protective clothing and using mosquito nets when rooms are not screened. Unlike other vectors, the *A. aegypti* mosquitoes bite during daytime hours.
- Recent travelers to endemic countries with acute onset of fever and other compatible symptoms should seek medical attention immediately.

For more information regarding international travel and dengue, contact the CDC's Traveler's Health Office at (877) 394-8747 or through the internet at <http://www.cdc.gov/travel>.

## ADDITIONAL INFORMATION

The following is the CDC surveillance case definition for dengue fever. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting a case to the MDPH always use the criteria in Section 2) A.

**Clinical description**

An acute febrile illness characterized by frontal headaches, retro-ocular pain, muscle and joint pain, and rash. The principal vector is the *A. aegypti* mosquito and transmission usually occurs in tropical or subtropical areas. Severe manifestations (*e.g.*, dengue hemorrhagic fever and dengue shock syndrome) are rare but may be fatal.

**Laboratory criteria for diagnosis**

- Isolation of dengue virus from serum and/or autopsy tissue samples, or
- Demonstration of a fourfold or greater rise or fall in reciprocal immunoglobulin G (IgG) or immunoglobulin M (IgM) antibody titers to one or more dengue virus antigens in paired serum samples, or
- Demonstration of dengue virus antigen in autopsy tissue or serum samples by immunohistochemistry or by viral nucleic acid detection.

**Case classification**

*Probable*: a clinically compatible case with supportive serologic findings (a reciprocal IgG antibody titer of ≥1280 or a positive IgM antibody test in a single acute (late)- or convalescent-phase serum specimen to one or more dengue virus antigens). *Confirmed*: a clinically compatible case that is laboratory confirmed.

## REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases, 24th Edition*. Illinois, American Academy of Pediatrics, 1997.

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CDC. Summary of Notifiable Diseases, United States, 1997, *MMWR*. 1998; 46 (54).

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Mandell, G., Bennett, J., Dolin, R., eds. *Principles and Practice of Infectious Diseases, Fourth Edition*. New York, Churchill Livingstone Inc., 1995.